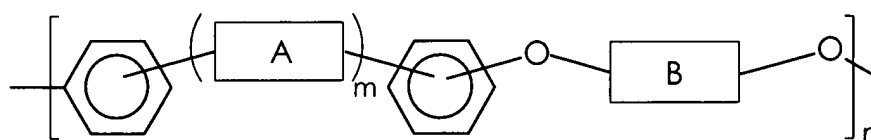
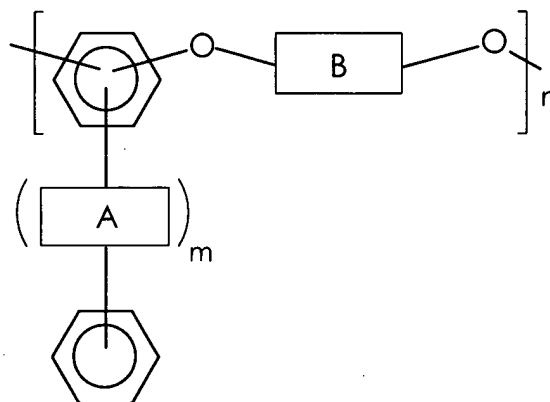


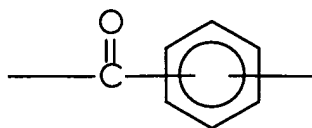
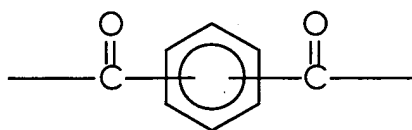
1. A process for preparing a branched polyarylene ether polymer which comprises (A) providing a reaction mixture which comprises (i) an optional solvent, (ii) a polyfunctional phenol compound of the formula  $\text{Ar}(\text{OH})_x$  wherein  $x \geq 3$  and wherein Ar is an aryl moiety or an alkylaryl moiety, provided that when Ar is an alkylaryl moiety at least three of the -OH groups are bonded to an aryl portion thereof, (iii) one or more linear polymers of the formula

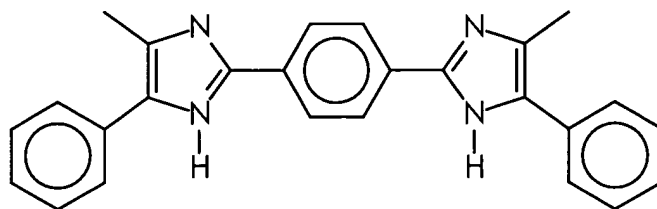
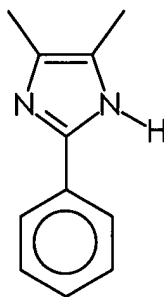
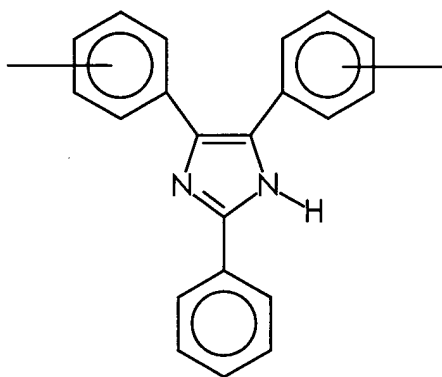
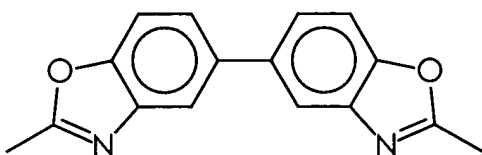
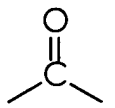
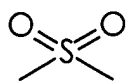


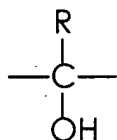
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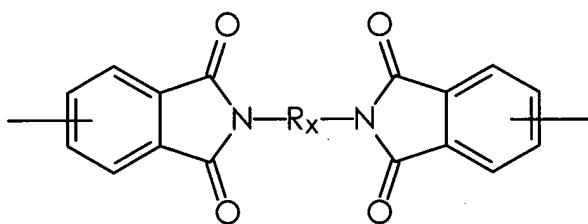
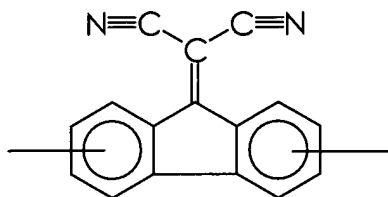
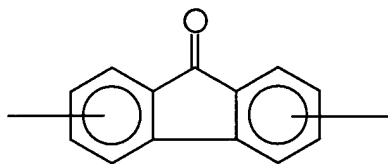
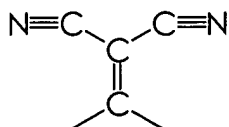
wherein each  $m$ , independently of the others, is an integer of 0 or 1, each A, independently of the others, is



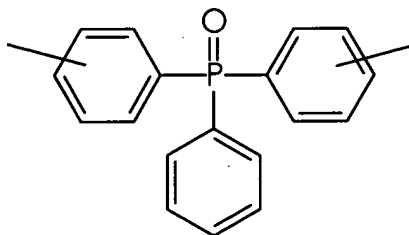


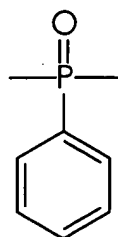


wherein R is a hydrogen atom, an alkyl group, an aryl group, an arylalkyl group, an alkylaryl group, or mixtures thereof,

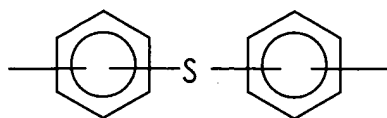
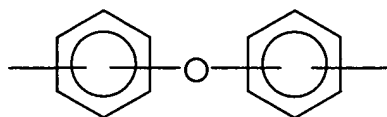
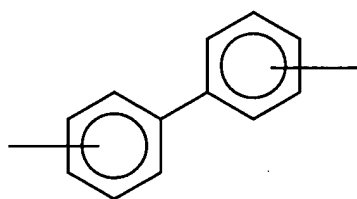
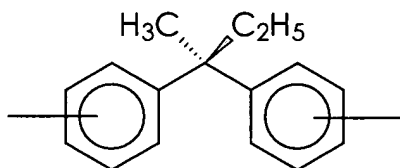
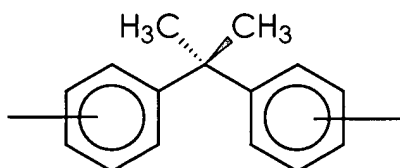
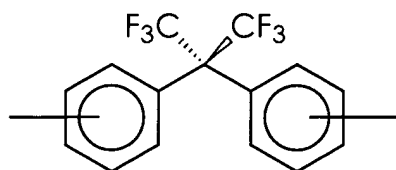


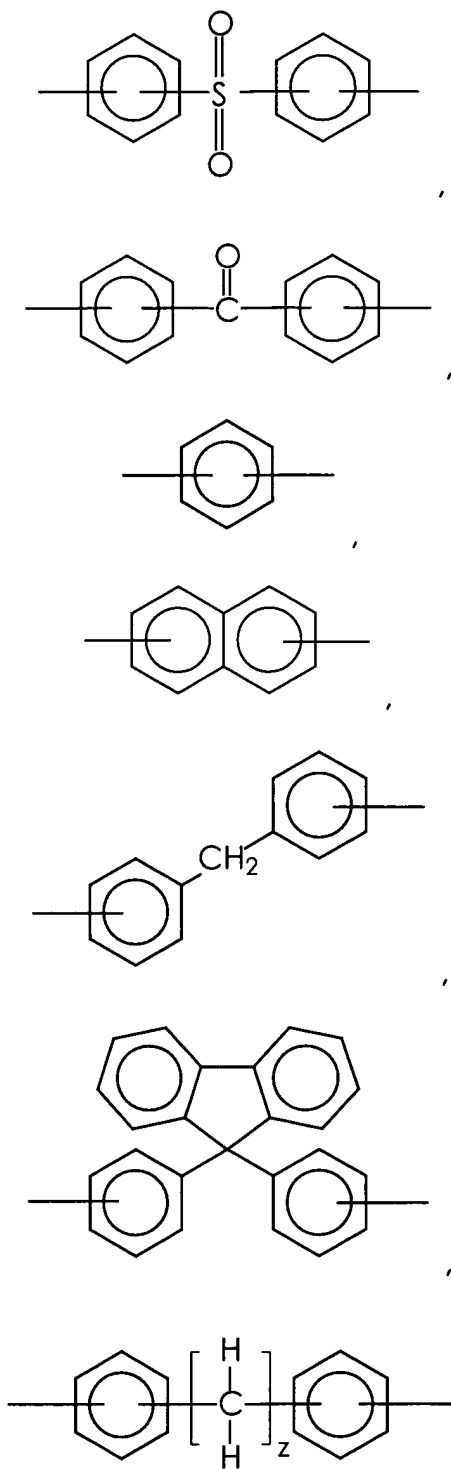
wherein R<sub>x</sub> is an alkylene group, an arylene group, an arylalkylene group, an alkylarylene group, or mixtures thereof,



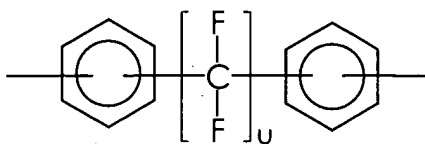


or mixtures thereof, each B, independently of the others, is

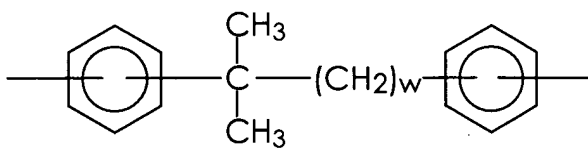
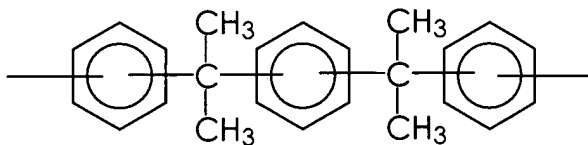
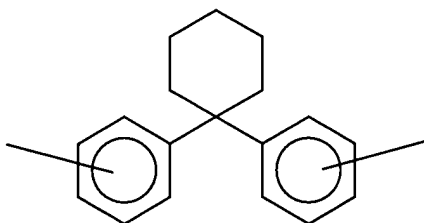
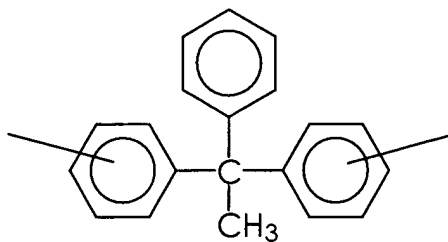




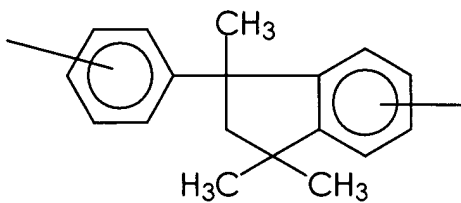
wherein z is an integer of from 2 to about 20,

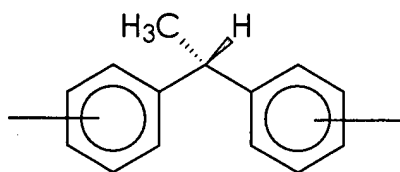
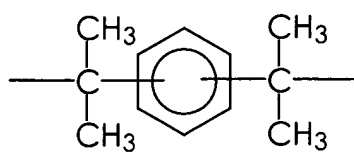
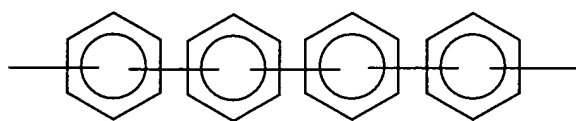
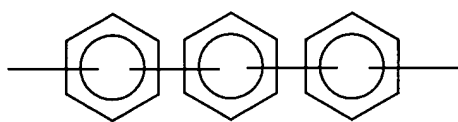
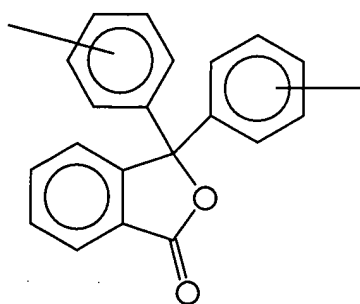
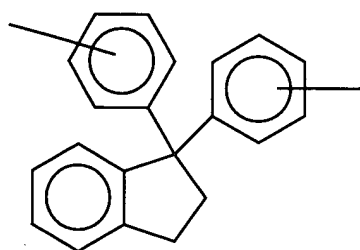


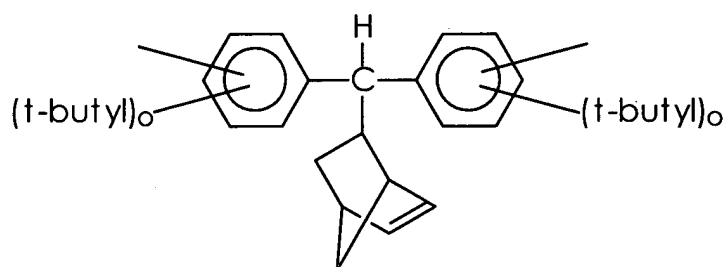
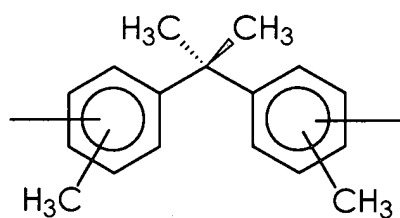
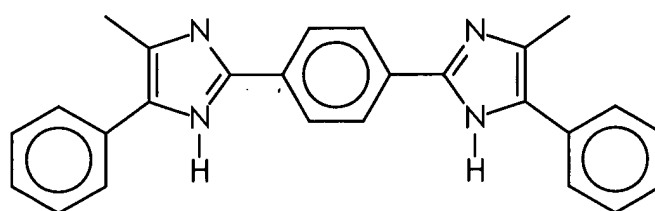
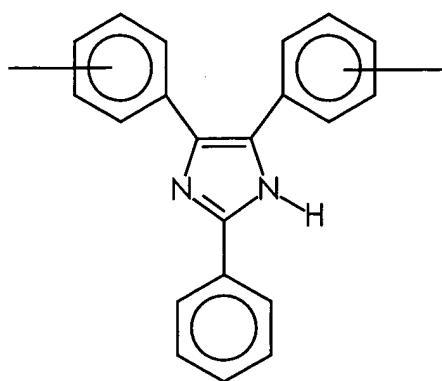
wherein u is an integer of from 1 to about 20,



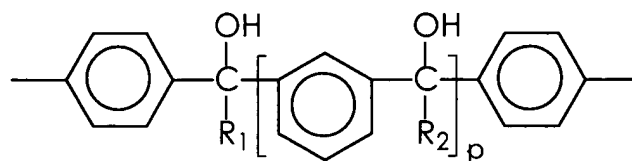
wherein w is an integer of from 1 to about 20,





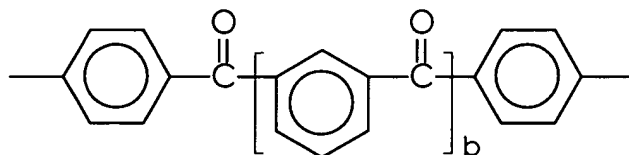


wherein each  $o$ , independently of the other, is an integer of 1, 2, 3, or 4,

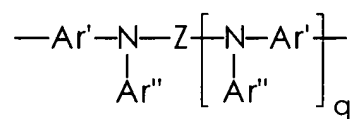




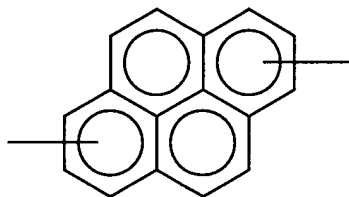
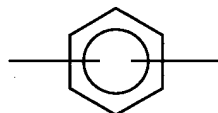
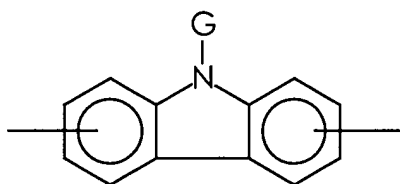
wherein  $R_1$  and  $R_2$  each, independently of the other, are hydrogen atoms, alkyl groups, aryl groups, arylalkyl groups, alkylaryl groups, or mixtures thereof, and  $p$  is an integer of 0 or 1,



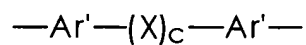
wherein  $b$  is an integer of 0 or 1,



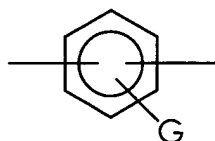
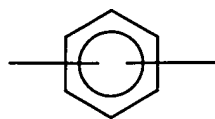
wherein (1)  $Z$  is



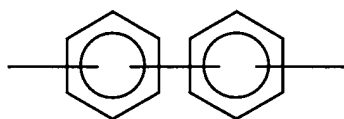
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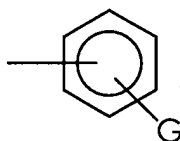
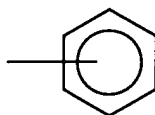
wherein  $c$  is 0 or 1; (2)  $Ar'$  is



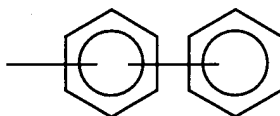
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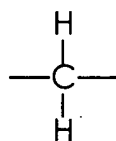
(3) G is an alkyl group selected from alkyl groups containing from about 2 to about 10 carbon atoms; (4) Ar'' is

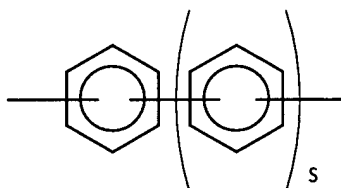
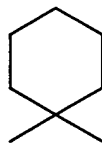
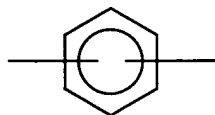
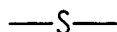
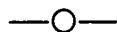
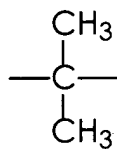


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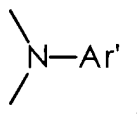


(5) X is

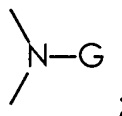




wherein  $s$  is 0, 1, or 2,



or

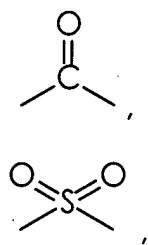


and (6)  $q$  is 0 or 1; or mixtures thereof, and  $n$  is an integer representing the number of repeat monomer units, (iv) optionally, a compound of the formula

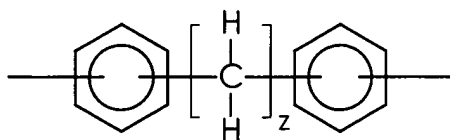
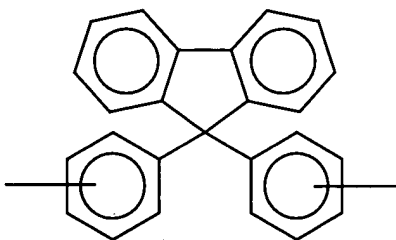
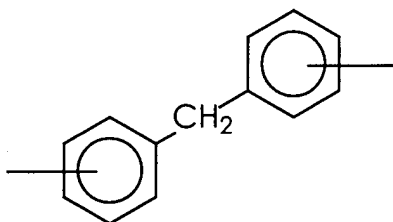
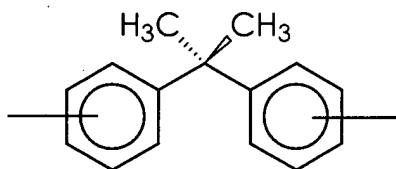
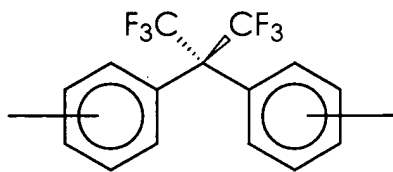


wherein a is an integer of from 1 to 5 and R' is a hydrogen atom, an alkyl group, an aryl group, an arylalkyl group, an alkylaryl group, or a mixture thereof, wherein two or more R' groups can be joined together to form a ring, and (v) a carbonate base; and (B) heating the reaction mixture and removing generated water from the reaction mixture, thereby effecting a polymerization reaction.

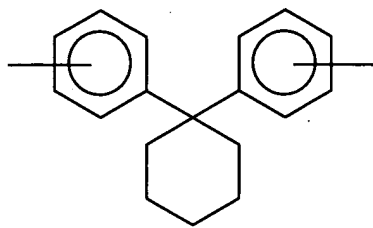
2. A process according to claim 1 wherein A is



or a mixture thereof and B is

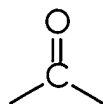


wherein  $z$  is an integer of from 2 to about 20,

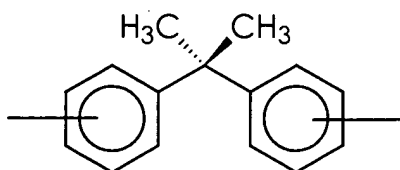


or a mixture thereof.

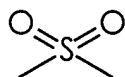
3. A process according to claim 1 wherein A is



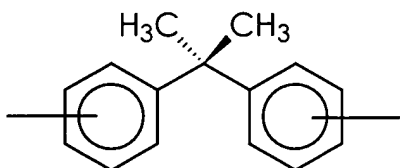
and B is



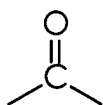
4. A process according to claim 1 wherein A is



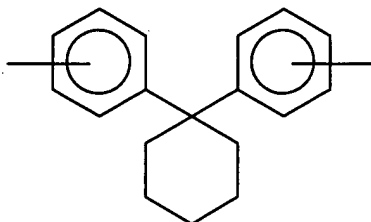
and B is



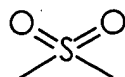
5. A process according to claim 1 wherein A is



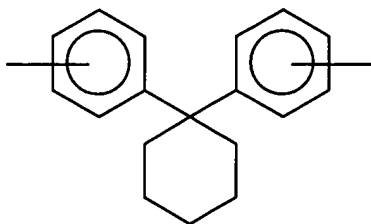
and B is



6. A process according to claim 1 wherein A is



and B is



7. A process according to claim 1 wherein Ar is a substituted aryl group or a substituted arylalkyl group.

8. A polymer according to claim 1 wherein Ar is an unsubstituted aryl group or an unsubstituted arylalkyl group.

9. A polymer according to claim 1 wherein Ar is an aryl group having one or more hetero atoms therein or an arylalkyl group having one or more hetero atoms therein.

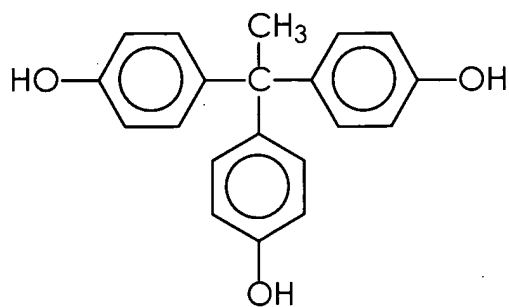
10. A polymer according to claim 9 wherein the one or more hetero atoms is oxygen, nitrogen, sulfur, silicon, phosphorus, or a mixture thereof.

11. A polymer according to claim 1 wherein Ar is an aryl group having no hetero atoms therein or an arylalkyl group having no hetero atoms therein.

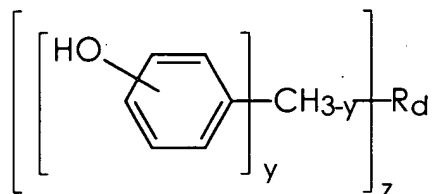
12. A process according to claim 1 wherein x is 3.



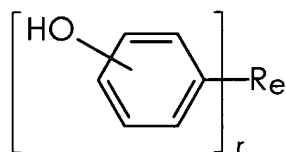
13. A process according to claim 1 wherein the polyfunctional phenol is



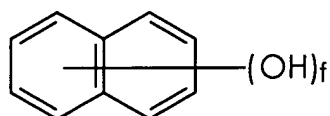
14. A process according to claim 1 wherein the polyfunctional phenol is (a) of the formula



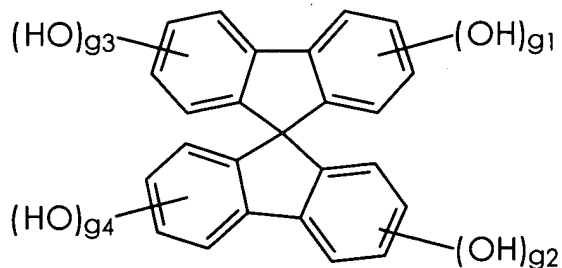
wherein y is an integer of 1, 2, or 3, z is an integer representing the number of HO- $\phi$ -CH<sub>3</sub>-y groups on R<sub>d</sub>, and R<sub>d</sub> is a monovalent moiety; (b) of the formula



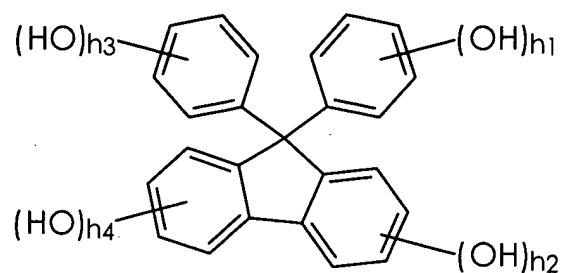
wherein r is an integer of at least about 3 and R<sub>e</sub> is an alkyl group, an aryl group, an arylalkyl group, or an alkylaryl group, (c) of the formula



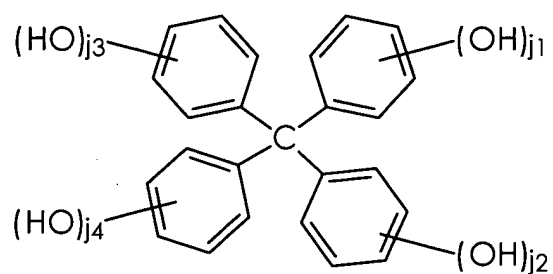
wherein f is an integer of at least 3, (d) of the formula



wherein g<sub>1</sub>, g<sub>2</sub>, g<sub>3</sub>, and g<sub>4</sub> are each integers of 0, 1, 2, 3, or 4, provided that the sum of g<sub>1</sub>+g<sub>2</sub>+g<sub>3</sub>+g<sub>4</sub> ≥ 3, (e) of the formula



wherein  $h_1$ ,  $h_2$ ,  $h_3$ , and  $h_4$  are each integers of 0, 1, 2, 3, or 4, provided that the sum of  $h_1+h_2+h_3+h_4 \geq 3$ , (f) of the formula



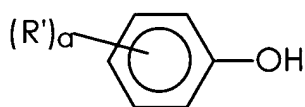
wherein  $j_1$ ,  $j_2$ ,  $j_3$ , and  $j_4$  are each integers of 0, 1, 2, 3, or 4, provided that the sum of  $j_1+j_2+j_3+j_4 \geq 3$ , or (g) mixtures thereof.

15. A process according to claim 1 wherein the polyfunctional phenol is 1,1,3-tris(2-methyl-4-hydroxy-5-tert-butylphenyl)butane, 3,3,3',3'-tetramethyl-1,1'-spirobisindane-5,5',6,6'-tetrol, pyrogallol, 1,2,4-benzenetriol, phloroglucinol dihydrate, dithranol, nordihydroguaiaretic acid, C-methylcalix[4]resorcinarene, C-undecylcalix[4]-resorcinarene monohydrate, catechin hydrate, epicatechin, or mixtures thereof.

16. A process according to claim 1 wherein a solvent is present.

17. A process according to claim 16 wherein the solvent is N,N-dimethylacetamide, sulfolane, dimethyl formamide, dimethyl sulfoxide, N-methyl pyrrolidinone, hexamethylphosphoric triamide, or mixtures thereof.

18. A process according to claim 1 wherein the compound of the formula

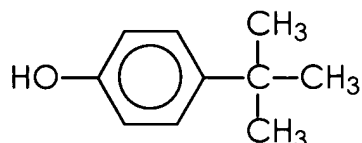


is present.

19. A process according to claim 18 wherein



is



20. A process according to claim 18 wherein



is a methyl phenol, an ethyl phenol, a propyl phenol, a butyl phenol, a pentyl phenol, a hexyl phenol, a heptyl phenol, an octyl phenol, a nonyl phenol, a decyl phenol, an undecyl phenol, a dodecyl phenol, a phenyl phenol, a tolyl phenol, a benzyl phenol, a methoxy phenol, an ethoxy phenol, a propoxy phenol, a butoxy phenol, a pentyloxy phenol, a hexyloxy phenol, a heptyloxy phenol, an octyloxy phenol, a nonyloxy phenol, a decyloxy phenol, an undecyloxy phenol, a dodecyloxy phenol, a phenoxy phenol, a tolyloxy phenol, a benzyloxy phenol, a (polyethyleneoxy) phenol, a (polypropyleneoxy) phenol, a (polybutyleneoxy) phenol, a naphthol, or a mixture thereof.

21. A process according to claim 1 wherein the carbonate base is lithium carbonate, sodium carbonate, potassium carbonate, cesium carbonate, or a mixture thereof.

22. A process according to claim 1 wherein the carbonate base is potassium carbonate.

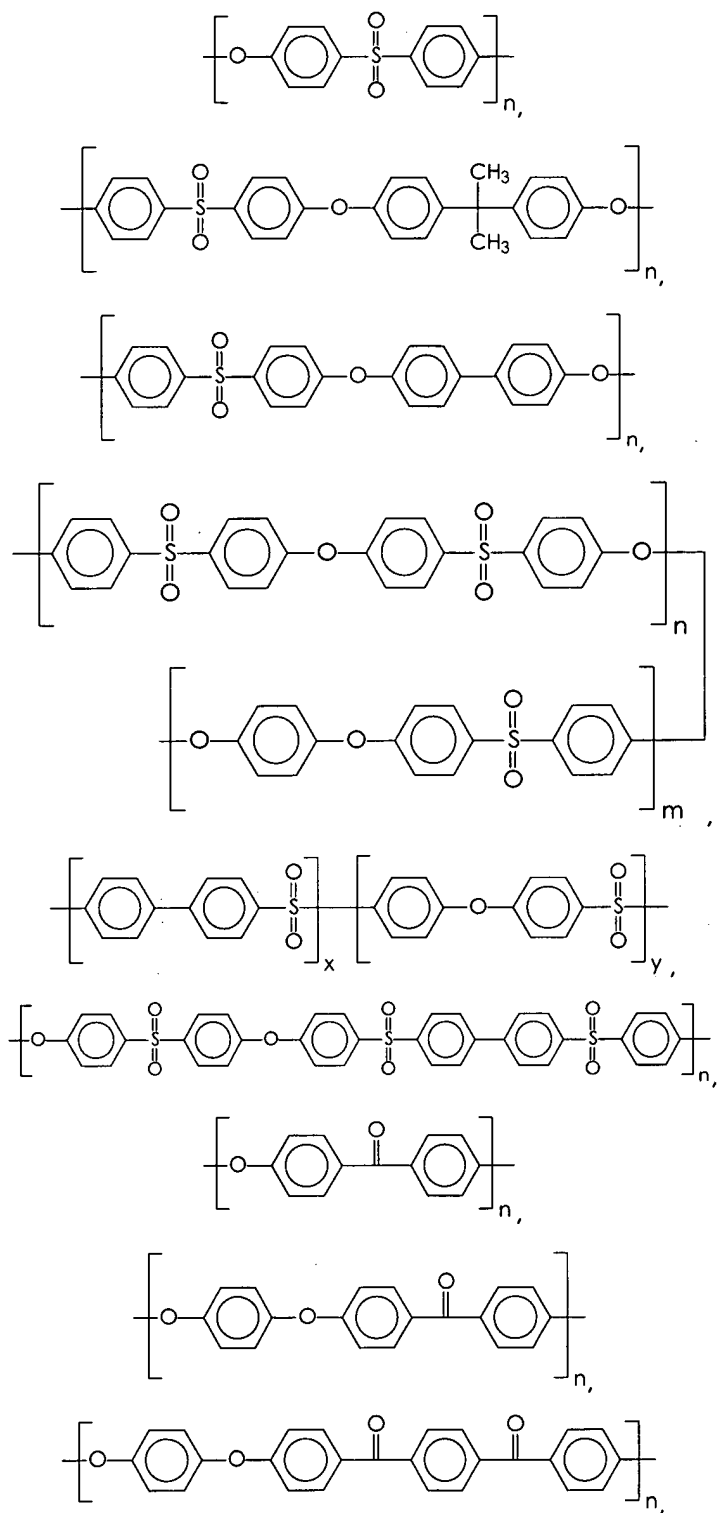
23. A process according to claim 1 wherein the carbonate base is cesium carbonate.

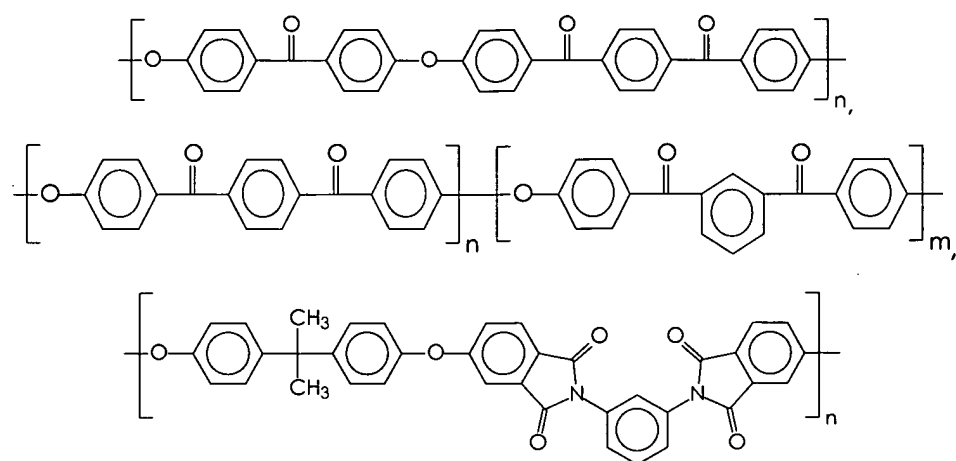
24. A process according to claim 1 wherein a solvent is present and wherein the reaction mixture is heated to reflux temperature.

25. A process according to claim 1 wherein water is removed from the reaction mixture by azeotropic distillation.

26. A process according to claim 25 wherein the azeotropic distillation is carried out with toluene.

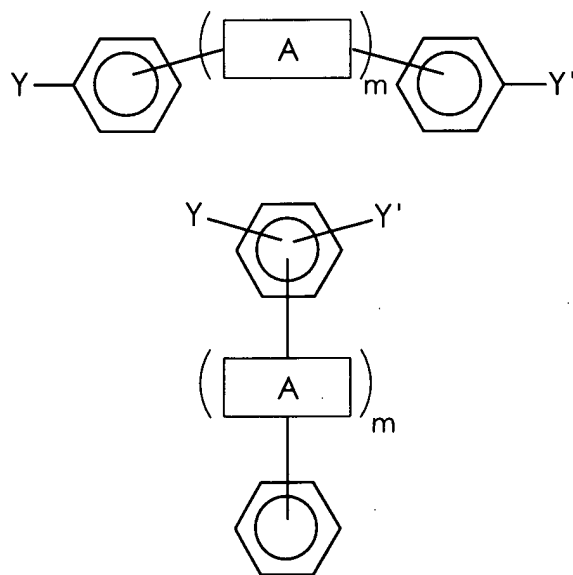
27. A process according to claim 1 wherein the linear polymer is





or mixtures thereof.

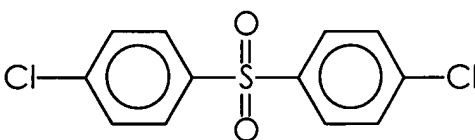
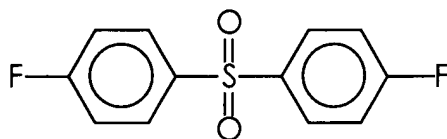
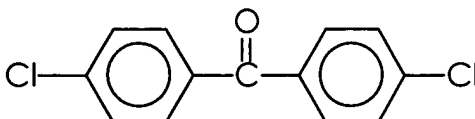
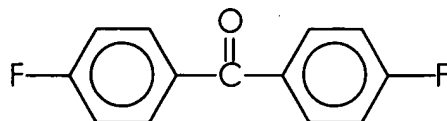
28. A process according to claim 1 wherein the reaction mixture further contains a dihalogenated compound of the formula



or mixtures thereof, wherein Y and Y' each, independently of the other, is a fluorine atom or a chlorine atom.



29. A process according to claim 28 wherein the dihalogenated compound is



or mixtures thereof.

30. A process according to claim 28 wherein the compound of the formula



is present, wherein the dihalogenated compound is present in an amount of at least about 0.4 mole of dihalogenated compound per every one mole of compound of the formula

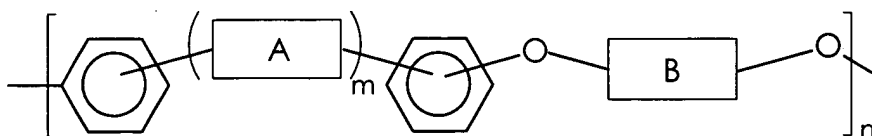


and wherein the dihalogenated compound is present in an amount of no more than about 0.6 mole of dihalogenated compound per every one mole of compound of the formula

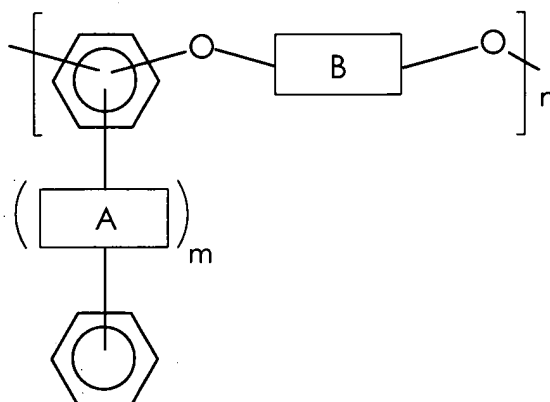


31. A process according to claim 28 wherein x is 3, wherein the dihalogenated compound is present in an amount of at least about 1.4 moles of dihalogenated monomer per every one mole of polyfunctional phenol compound, and wherein the dihalogenated compound is present in an amount of no more than about 1.6 moles of dihalogenated monomer per every one mole of polyfunctional phenol compound.

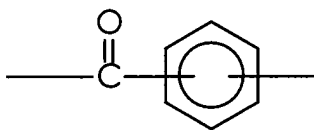
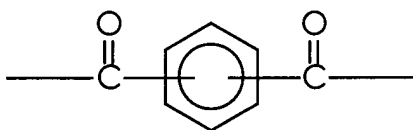
32. A process for preparing a branched polyarylene ether polymer which comprises (A) providing a reaction mixture which comprises (i) a solvent, (ii) a polyfunctional phenol compound of the formula  $\text{Ar}(\text{OH})_x$  wherein  $x \geq 3$  and wherein Ar is an aryl moiety or an alkylaryl moiety, provided that when Ar is an alkylaryl moiety at least three of the -OH groups are bonded to an aryl portion thereof, (iii) one or more linear polymers of the formula

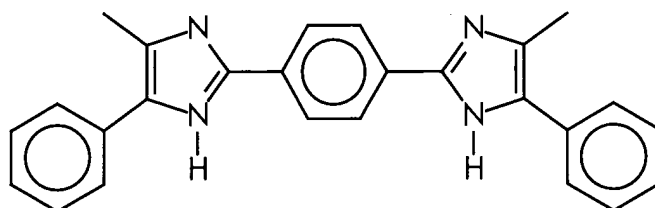
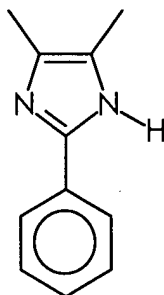
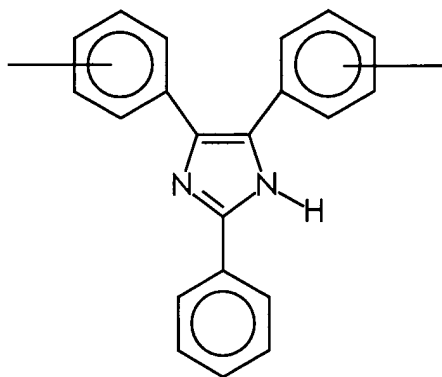
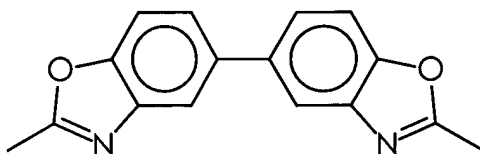
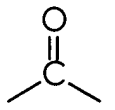
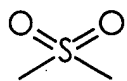


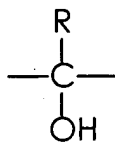
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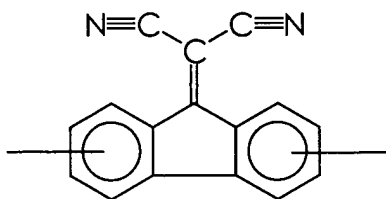
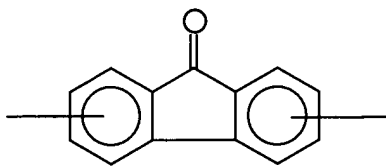
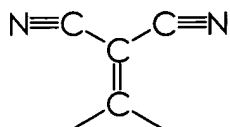
wherein each  $m$ , independently of the others, is an integer of 0 or 1, each A, independently of the others, is



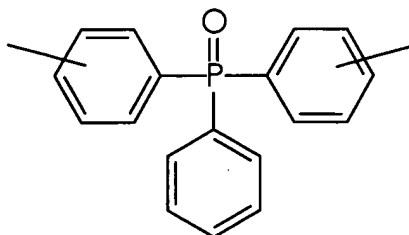


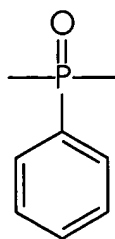


wherein R is a hydrogen atom, an alkyl group, an aryl group, an arylalkyl group, an alkylaryl group, or mixtures thereof,

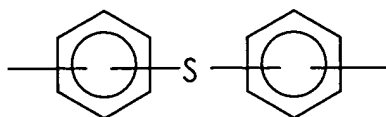
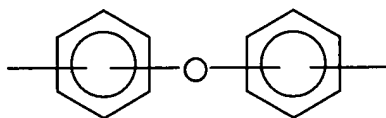
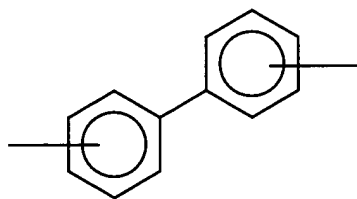
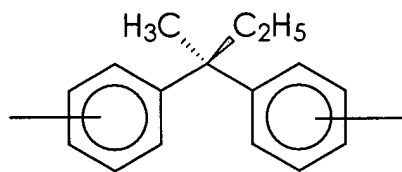
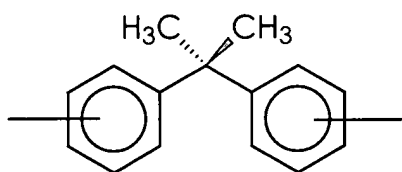
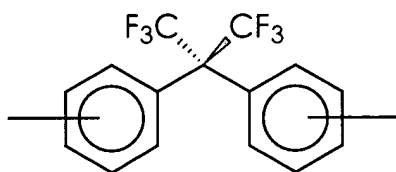


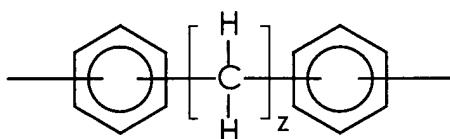
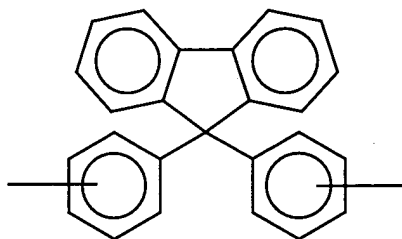
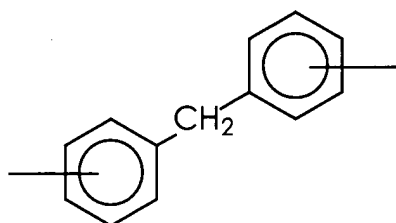
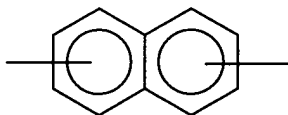
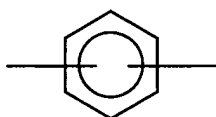
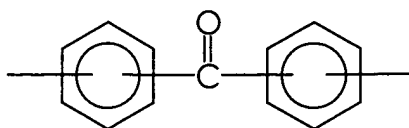
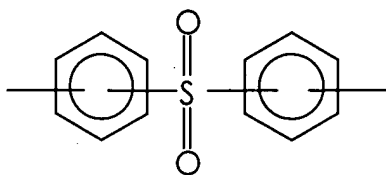
wherein R<sub>x</sub> is an alkylene group, an arylene group, an arylalkylene group, an alkylarylene group, or mixtures thereof,



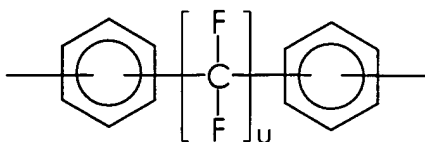


or mixtures thereof, each B, independently of the others, is

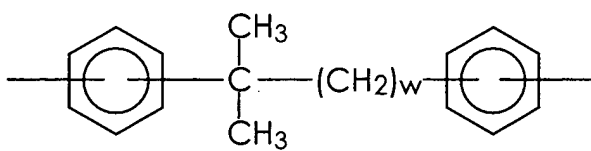
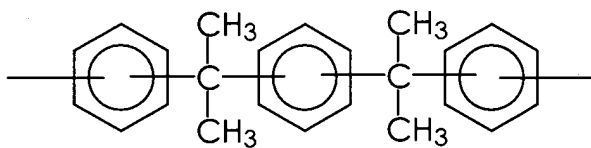
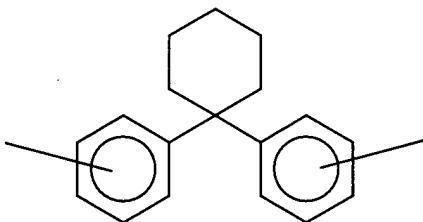
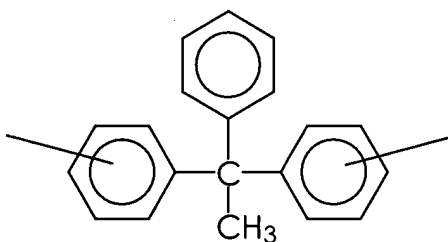




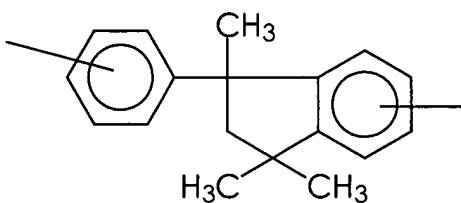
wherein  $z$  is an integer of from 2 to about 20,



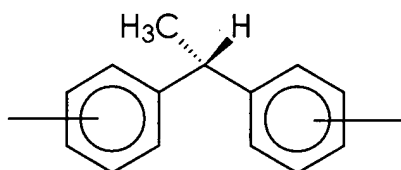
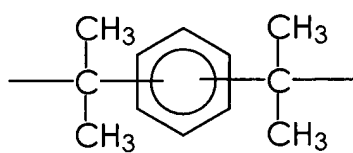
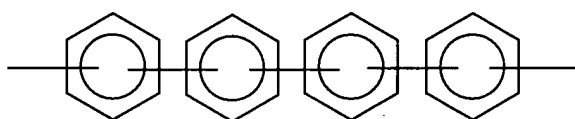
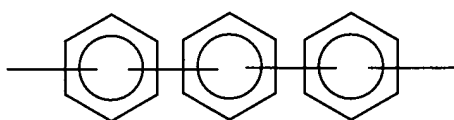
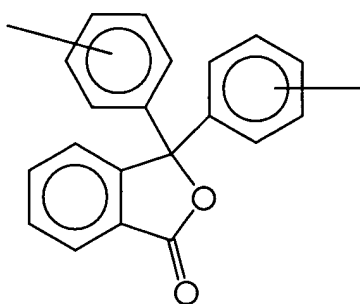
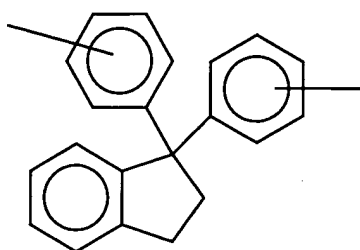
wherein u is an integer of from 1 to about 20,

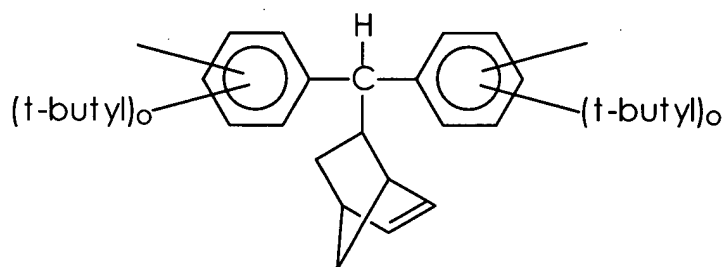
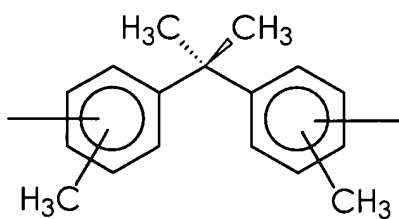
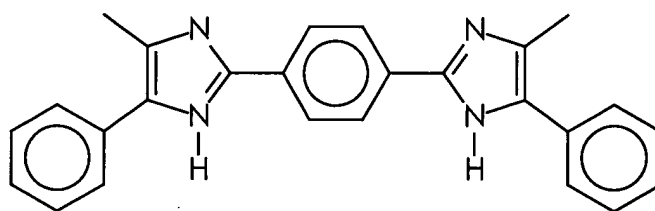
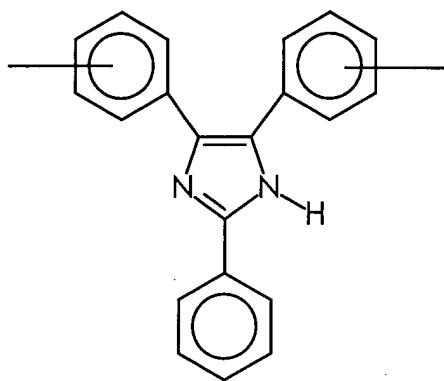


wherein w is an integer of from 1 to about 20,

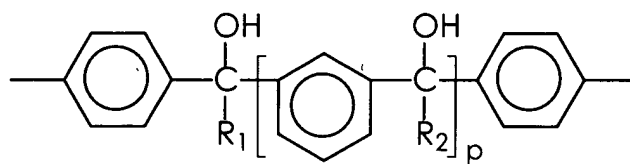




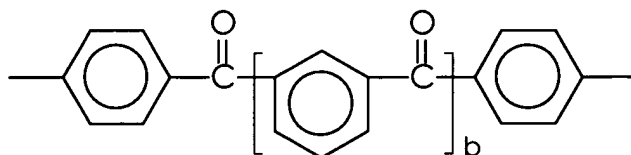




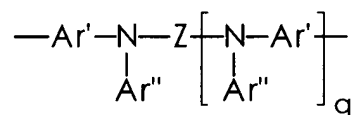
wherein each o, independently of the other, is an integer of 1, 2, 3, or 4,



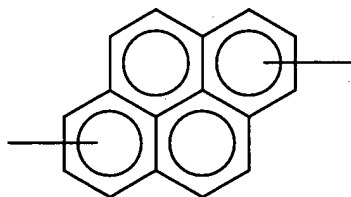
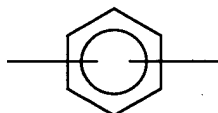
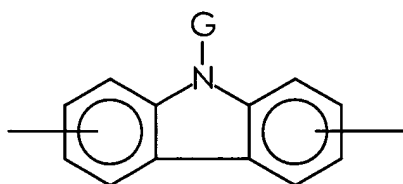
wherein  $R_1$  and  $R_2$  each, independently of the other, are hydrogen atoms, alkyl groups, aryl groups, arylalkyl groups, alkylaryl groups, or mixtures thereof, and  $p$  is an integer of 0 or 1,



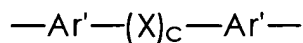
wherein  $b$  is an integer of 0 or 1,



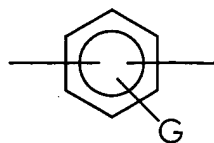
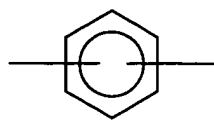
wherein (1)  $Z$  is



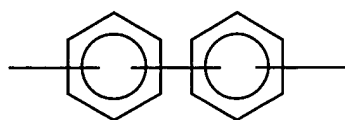
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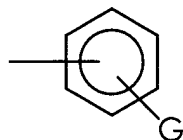
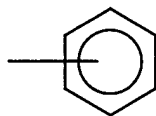
wherein  $c$  is 0 or 1; (2)  $\text{Ar}'$  is



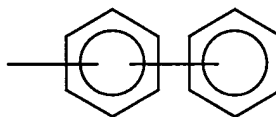
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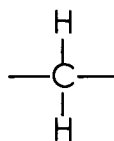
(3) G is an alkyl group selected from alkyl groups containing from about 2 to about 10 carbon atoms; (4) Ar'' is

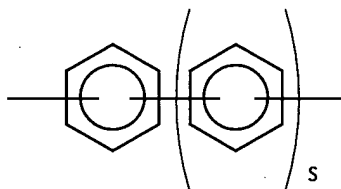
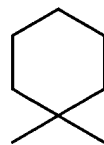
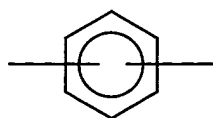
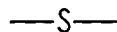
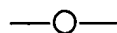
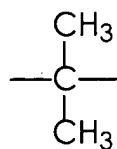


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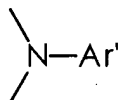


(5) X is

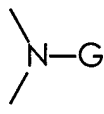




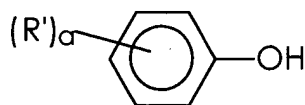
wherein  $s$  is 0, 1, or 2,



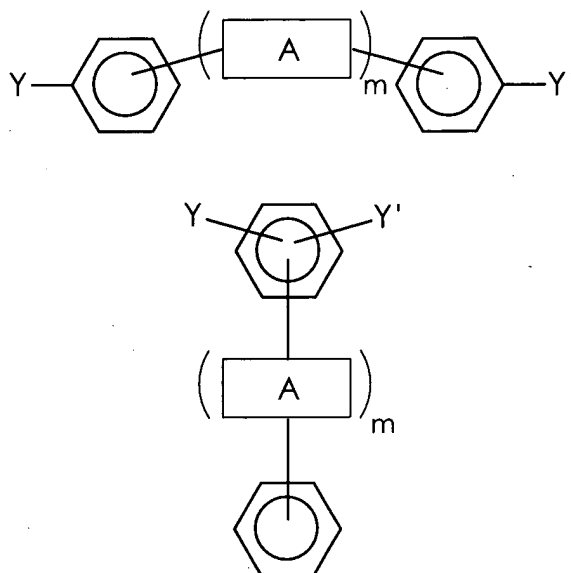
or



and (6)  $q$  is 0 or 1; or mixtures thereof, and  $n$  is an integer representing the number of repeat monomer units, (iv) a compound of the formula

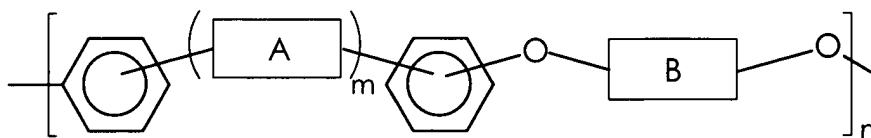


wherein a is an integer of from 1 to 5 and R' is a hydrogen atom, an alkyl group, an aryl group, an arylalkyl group, an alkylaryl group, or a mixture thereof, wherein two or more R' groups can be joined together to form a ring, (v) a carbonate base, and (vi) a dihalogenated monomer compound of the formula

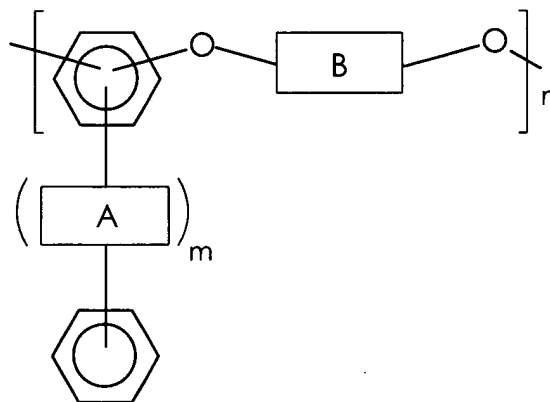


or mixtures thereof, wherein Y and Y' each, independently of the other, is a fluorine atom or a chlorine atom; and (B) heating the reaction mixture and removing generated water from the reaction mixture, thereby effecting a polymerization reaction.

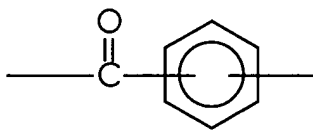
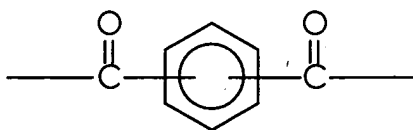
33. A process for preparing a branched polyarylene ether polymer which comprises (A) providing a reaction mixture which comprises (i) a solvent, (ii) a polyfunctional phenol compound of the formula  $\text{Ar}(\text{OH})_x$  wherein  $x \geq 3$  and wherein Ar is an aryl moiety or an alkylaryl moiety, provided that when Ar is an alkylaryl moiety at least three of the -OH groups are bonded to an aryl portion thereof, (iii) one or more linear polymers of the formula

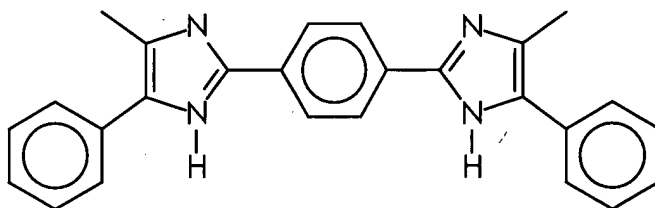
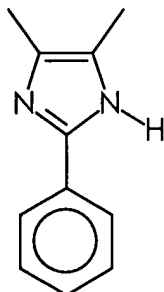
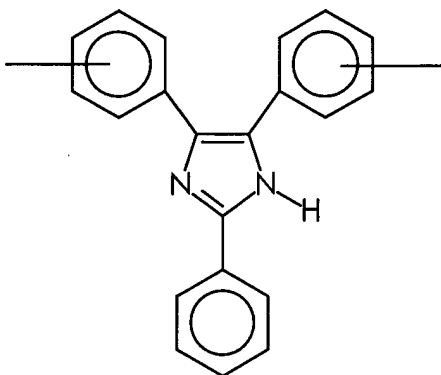
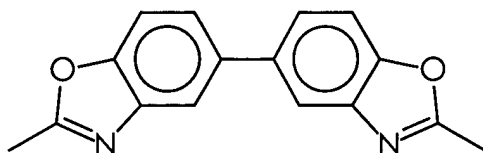
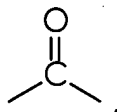
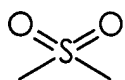


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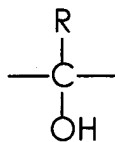


wherein each  $m$ , independently of the others, is an integer of 0 or 1, each A, independently of the others, is

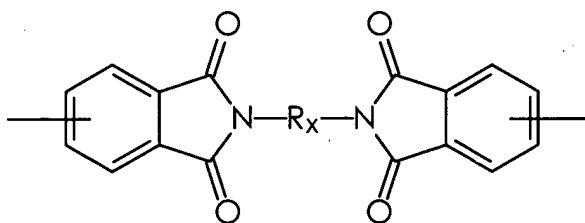
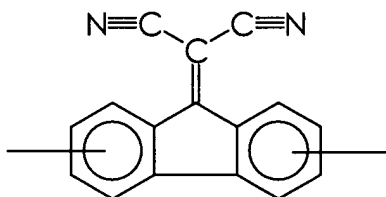
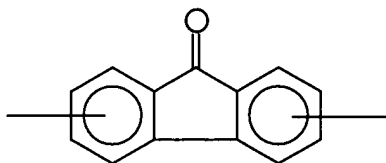
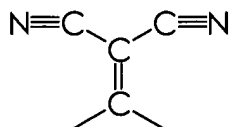




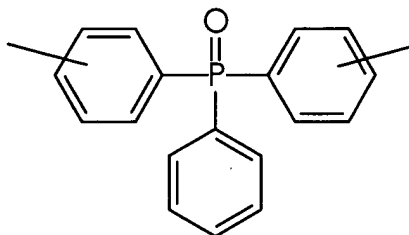


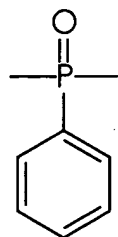


wherein R is a hydrogen atom, an alkyl group, an aryl group, an arylalkyl group, an alkylaryl group, or mixtures thereof,

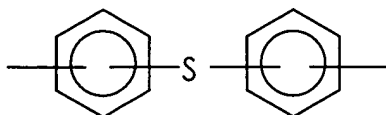
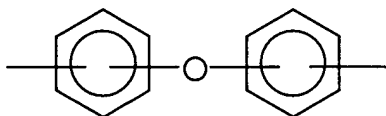
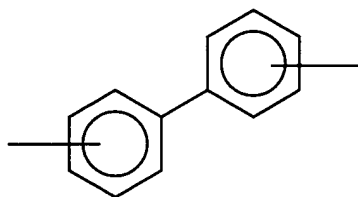
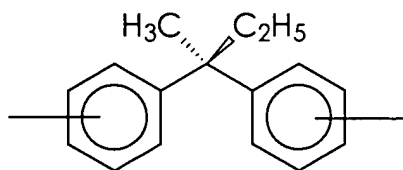
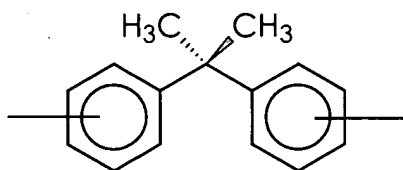
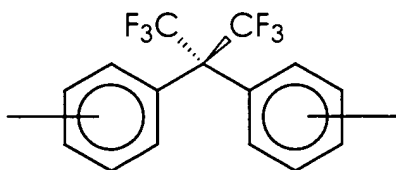


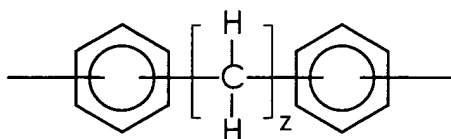
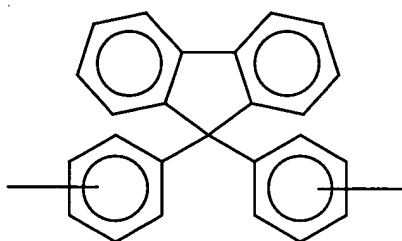
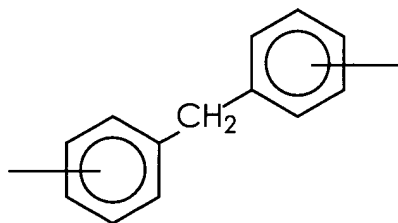
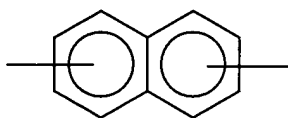
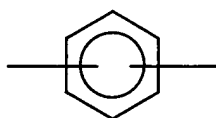
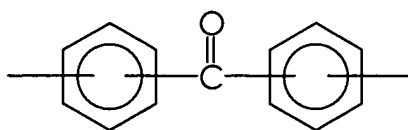
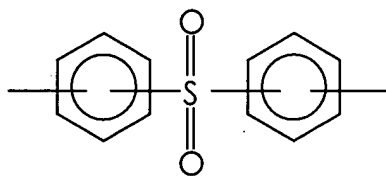
wherein R<sub>x</sub> is an alkylene group, an arylene group, an arylalkylene group, an alkylarylene group, or mixtures thereof,



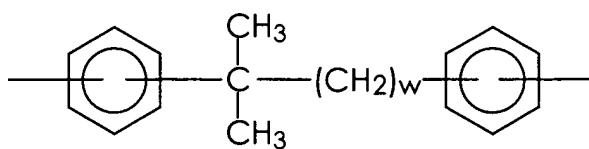
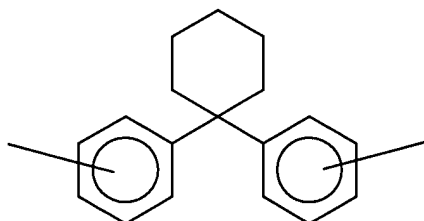


or mixtures thereof, each B, independently of the others, is



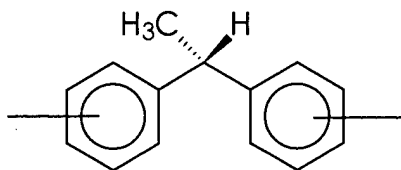
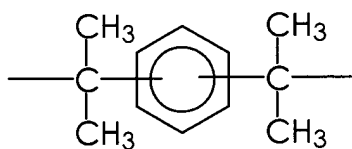
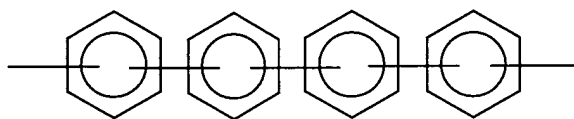
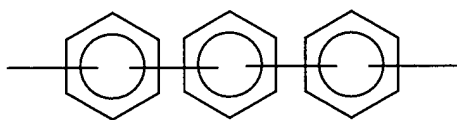
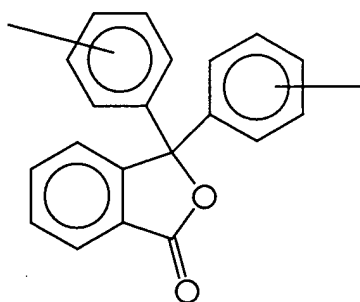
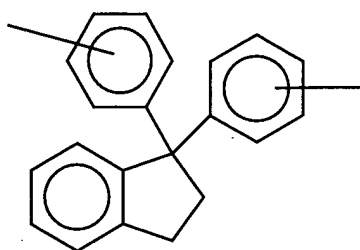


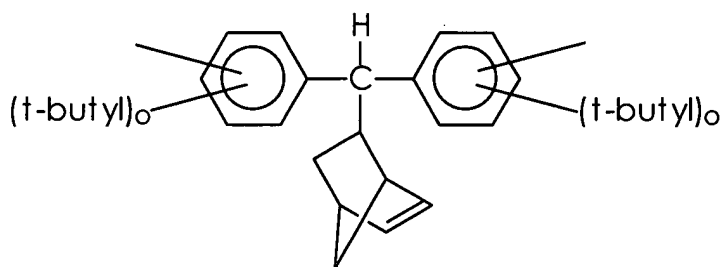
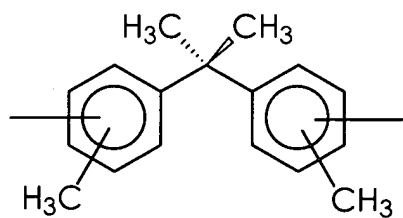
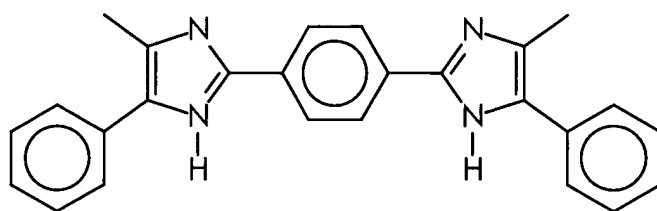
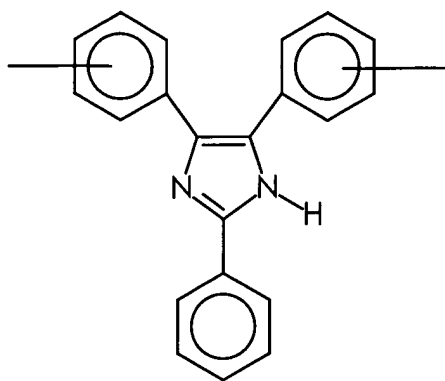
wherein  $z$  is an integer of from 2 to about 20,



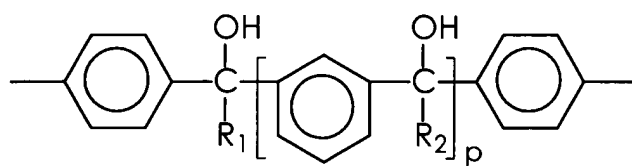
wherein w is an integer of from 1 to about 20,



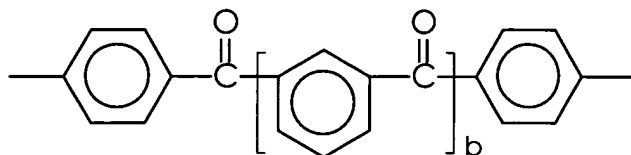




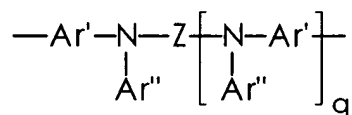
wherein each  $o$ , independently of the other, is an integer of 1, 2, 3, or 4,



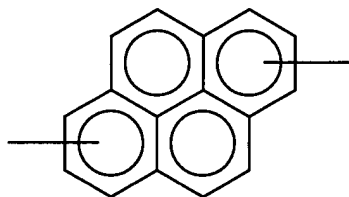
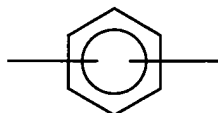
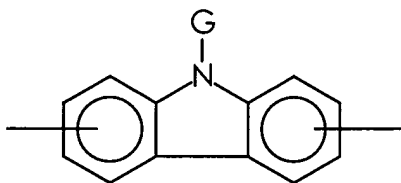
wherein  $R_1$  and  $R_2$  each, independently of the other, are hydrogen atoms, alkyl groups, aryl groups, arylalkyl groups, alkylaryl groups, or mixtures thereof, and  $p$  is an integer of 0 or 1,



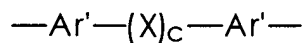
wherein  $b$  is an integer of 0 or 1,



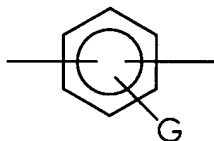
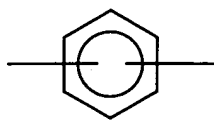
wherein (1)  $Z$  is



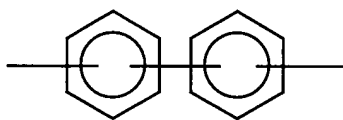
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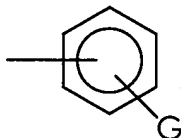
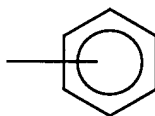
wherein  $c$  is 0 or 1; (2)  $Ar'$  is



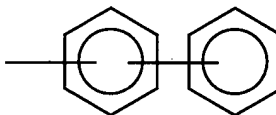
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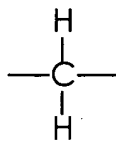
(3) G is an alkyl group selected from alkyl groups containing from about 2 to about 10 carbon atoms; (4) Ar'' is



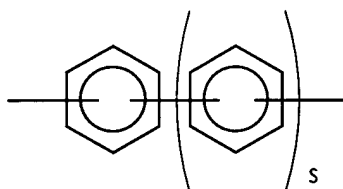
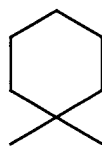
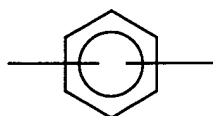
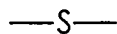
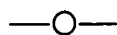
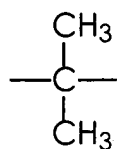
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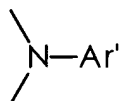
(5) X is



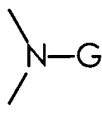




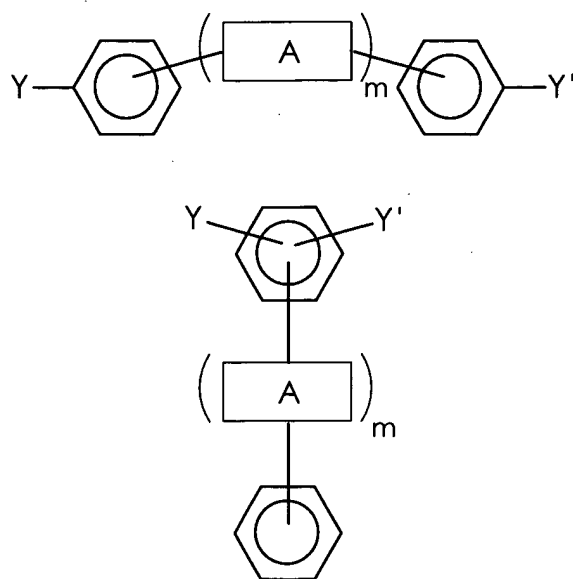
wherein s is 0, 1, or 2,



or



and (6) q is 0 or 1; or mixtures thereof, and n is an integer representing the number of repeat monomer units, (iv) a carbonate base, and (v) a dihalogenated monomer compound of the formula



or mixtures thereof, wherein Y and Y' each, independently of the other, is a fluorine atom or a chlorine atom; and (B) heating the reaction mixture and removing generated water from the reaction mixture, thereby effecting a polymerization reaction.